

IV. GENERAL ASHRAE OPTION: SEPARATION OF SMOKERS AND NONSMOKERS
WITHIN THE WORKPLACE WHERE SMOKING AND NONSMOKING AREAS SHARE
A COMMON VENTILATION SYSTEM

A. General

The scientific literature reveals that simple separation of nonsmokers and smokers can adequately minimize nonsmoker exposure to environmental tobacco smoke. Moreover, adequate ventilation, as specified in ASHRAE Standard 62-1989 ("Ventilation for Acceptable Indoor Air Quality"), can effectively and efficiently reduce levels of ETS constituents as well as levels of numerous other substances that may affect the quality of indoor air.

The goal for any workplace is to provide workers with acceptable overall indoor air quality and ventilation effectiveness. In order to meet that goal, the workplace must have generally accepted ventilation rates. Specifically, unless otherwise specified in building codes, offices, restaurants, etc. should comply with the ventilation rates recommended in ASHRAE Standard 62-1989.

In the case of indoor office work environments, the ASHRAE Standard stipulates a minimum outside air ventilation rate of 20 cfm/person. With such ventilation rates, moderate smoking

activity is accommodated. However, if physical grouping of smokers and nonsmokers in discrete areas is still desirable, prevailing air circulation currents and routes of supply and exhaust air may be considered. If possible, smoking areas should be placed nearer exhaust systems so that air movement will be directed from nonsmoking areas to smoking areas, thereby minimizing migration of tobacco smoke from smoking areas.

In buildings meeting the ASHRAE 62-1989 Standard for Ventilation, return air from designated smoking areas will be diluted by outside air and filtered prior to returning to the supply system. The dilution factor will make it difficult for office occupants to differentiate between totally smoke-free air and diluted and recirculated air that includes some return air from smoking areas.

The ASHRAE Standard 62-1989 addresses ventilation requirements for a variety of indoor environments and can be consulted for specific guidance concerning such spaces. The standard also addresses smoking lounges, so dedicated smoking lounges can be incorporated in the overall ASHRAE approach.

B. [Proposed Legislation]. OPTION: Controlled Smoking
Within the Workplace Where Smoking and Nonsmoking Areas
Share a Common Ventilation System

[]. Recognizing the interests of both smokers and nonsmokers, smoking will be permitted in [indoor workplaces] [public places] [government buildings] as follows where smoking and nonsmoking areas share a common ventilation system:

- a. unless otherwise specified in building codes, ASHRAE ventilation standard 62-1989 shall be implemented to guarantee an outdoor air exchange rate of at least 20 cfm/person;
- b. moderate smoking may be permitted in areas ventilated in accordance with the then-existing version of ASHRAE 62-1989;
- c. in buildings meeting the ASHRAE 62-1989 standard for ventilation, return air from areas where smoking is permitted shall be diluted by outside air and filtered prior to returning to the supply system;

d. filters should have a minimum filtration efficiency of 40 percent according to ASHRAE ventilation standard 52-76;

e. to facilitate the foregoing, employers should also consider the following measures:

- (1) confirm that fresh air is distributed evenly throughout occupied spaces;
- (2) ensure that outdoor air intakes are open and clean;
- (3) install air filters properly to prevent air bypass around filter edges;
- (4) consider 100 percent air exchange and energy recovery using heat exchangers to provide maximum ventilation if complaints about indoor air quality persist; and
- (5) physically group smokers and nonsmokers in discrete areas, and consider locating the discrete smoking areas nearer exhaust systems.

[]. Dedicated smoking lounges ventilated as required by ASHRAE 62-1989 may be utilized in addition to the arrangements for moderate smoking in properly ventilated areas.

C. Discussion Regarding Simple Separation of Smokers and Nonsmokers

It has been argued that ventilation is not effective in diluting ETS constituents, and that simple separation of smokers and nonsmokers does not effectively minimize nonsmoker exposure to ETS. For example, the 1986 Report of the Surgeon General on ETS suggests that separation of smokers and nonsmokers is not effective in minimizing nonsmoker exposure to ETS. The 1991 NIOSH "Current Intelligence Bulletin on ETS" suggests that smokers should be segregated into a common area which is equipped with separate ventilation and exhaust systems.

1. The Importance of Adequate Ventilation

Tobacco smoke is often initially blamed for complaints about indoor air quality because it is both easily seen and smelled. Four large databases from the U.S. and Canada on hundreds of sick-building syndrome investigations reveal that only 2-4% of complaints from occupants in buildings investigated can be traced to tobacco smoke exposures. In over half of the buildings

investigated, inadequate ventilation has been identified as the ultimate cause of complaints. These data indicate that complaints about tobacco smoke often represent a larger underlying problem, namely, that of inadequate ventilation.

A current, widely adopted consensus standard on ventilation, ASHRAE 62-1989, recommends ventilation rates for offices and public buildings to ensure acceptable indoor air quality and to avoid adverse health effects. The ventilation rates specified in this standard, adopted by various building code organizations and many municipalities through the U.S., assume the presence of smokers and are designed to deal with all kinds of substances in indoor air, including tobacco smoke. The standard has been effective in addressing indoor air quality complaints and has been recommended for the prevention and mitigation of indoor air quality problems. New and renovated public buildings and offices must comply with the design specifications for ventilation in ASHRAE 62-1989.

Implementation of a generic ventilation-based indoor air quality standard, such as that recommended by ASHRAE, offers a comprehensive solution to poor indoor air quality. Adequate supply (outdoor) air intake and its appropriate distribution throughout occupied spaces serves to dilute and/or remove a wide range of potential substances in the indoor air, including volatile organic compounds, carbon monoxide, carbon dioxide, constituents of ETS,

radon and biologicals. Even though workplace office configurations are infinitely varied, the ventilation solution remains constant as the work activities of building tenants change over time.

2. The Recirculation Issue

Proponents of smoking bans or restrictions in the workplace are apparently unaware of the existence of the large database on workplace exposures to ETS constituents and the data regarding the efficacy of ASHRAE Standard 62-1989. The workplace smoking debate therefore often begins with a presumption of significant risk, together with a presumption that no reduction of exposures is possible.¹⁹ The smoking restriction proponent begins with the Surgeon General's pronouncement in 1986 that the separation of smokers and nonsmokers in the workplace "may reduce, but does not eliminate, exposure to ETS." The Surgeon General's claim was made without any reference to the scientific literature and without any supporting data. Implicit in the Surgeon General's claim is the issue of the feasibility of smokers and nonsmokers sharing a common ventilation system, with the recirculation of air among smokers and nonsmokers.

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19. This attitude is so prevalent that the 1990 OSHA Technical Manual states, under its Administrative and Work Practice Recommendations:

Eliminate or reduce contamination of the air supply with cigarette smoke by banning smoking or restricting smoking to designated areas which have their air discharged directly to the outdoors rather than recirculated. (6-11)

Contrary to the Surgeon General, a number of studies in the published literature indicate that the simple separation of smokers and nonsmokers, under general recirculation conditions, can effectively reduce (and in many instances, may essentially eliminate) exposure to ETS. One recent study reported that the use of designated smoking areas reduced exposure to ETS by as much as 95%. Another study of a smoking-restricted office building reported that ambient nicotine in nonsmoking areas was virtually undetectable, suggesting that ETS had a negligible impact on the nonsmoking areas of the building.

Canadian researchers presented results on levels of ETS constituents in offices where smoking was regulated and unregulated. They reported no significant differences in average ETS constituent levels between nonsmoking offices that received recirculated air from designated smoking areas and nonsmoking offices that did not receive recirculated air. Nicotine concentrations for nonsmoking areas were reportedly only marginally above limits of detection; there were no measurable differences in respirable particulates or carbon monoxide levels in nonsmoking areas that did or did not receive recirculated air from smoking areas.

Hedge, et al., in 1991 reported results of ETS constituent measurements taken in buildings with different smoking policies. For most constituents, the researchers reported no

significant differences in concentrations among offices in smoking prohibited buildings and nonsmoking office areas in buildings where smoking was restricted to (1) rooms with local filtration, (2) areas with no local air treatment, (3) rooms with separate ventilation or (4) open workstations and enclosed offices.

Investigators from Healthy Buildings International recently summarized results of their paper entitled "The Measurement of Environmental Tobacco Smoke in 585 Office Environments." Using measured nicotine and particulate levels as markers for the presence of ETS, the investigators reported "spillover" of ETS in only 4% of the offices investigated.

Recent studies on ETS constituent levels aboard commercial aircraft, including a 1989 study performed for the U.S. Department of Transportation, indicate the effectiveness of simple separation of smokers and nonsmokers in the minimization of ETS exposures.

Similarly, Proctor (1987) monitored ETS constituents before and after a smoking ban on public transportation in the United Kingdom. While nicotine concentrations decreased from 7 ug/m³ (micrograms per cubic meter) to 3 ug/m³ in nonsmoking compartments after the ban, particulate and CO levels remained unchanged. This suggests that ETS contributions to levels of particulates and CO in public transportation are not significant.

The options are available for those who desire to physically segregate smokers and nonsmokers in the workplace. However, no data exist which suggest that the dedicated smoking lounge will significantly reduce exposure to ETS-related constituents beyond reductions achieved by appropriate ventilation and the simple separation of smokers from nonsmokers. Thus, the submission to the OSHA RFI public docket from R.J. Reynolds observes:

Any assessment of the need for measures to supplement a generic standard with special provisions such as mandated smoking lounges with separate exhaust or a smoking ban to reduce further any residual levels of ETS would plainly reveal that such measures would only result in an insubstantial reduction of an already de minimis exposure level. Accordingly, the imposition of such measures as mandated smoking lounges or smoking bans would be impermissible under the Supreme Court's direction that OSHA is authorized only to eliminate significant risks and may not seek the 'regulation of insignificant risks.'
(3-1086)

The studies mentioned above provide data regarding the extremely low levels of ETS constituents that are supposedly "transferred" from smoking to nonsmoking areas, even under conditions involving a shared ventilation system. Data reported in those studies indicate that ETS constituents in nonsmoking areas in buildings where smoking is permitted are often only slightly above the limits of detection, and often indistinguishable, from levels that can be found in buildings in which smoking is altogether

prohibited. The data therefore support the contention that simple separation of smokers and nonsmokers effectively reduces and may essentially eliminate ETS exposure in nonsmoking areas, even under conditions of recirculation.

D. References Regarding Separation of Smokers and Nonsmokers

1. Vaughan, W. and Hammond, K., "Impact of 'Designated Smoking Area' Policy on Nicotine Vapor and Particle Concentrations in a Modern Office Building," J. Air Waste Manage. Assoc. 40: 1012-1017, 1990.
2. Hedge, A., et al., "Building Ventilation and Smoking Policy Effects on Indoor Air Quality and Employee Comfort and Health," Indoor Air '90, Toronto, Canada, July 29-August 3: 739-744, 1990.
3. Sterling, T. and B. Mueller, "ETS in Offices and When Smoking is Restricted to Designated but Not Separately Ventilated Areas," Indoor Air Quality, ed. H. Kasuga, Springer-Verlag, Berlin Heidelberg: 120-129, 1990.
4. Hedge, A., et al., "The Effects of Smoking Policy on Indoor Air Quality and Sick Building Syndrome in 18 Air-Conditioned Offices," IAQ 91: Healthy Buildings: 151-159, 1991.
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6. Proctor, C., et al., "Measurements of Environmental Tobacco Smoke in an Air-Conditioned Office Building," Environ Technol Letters (10): 1003-1018, 1989.
7. Bayer, C. and Black, M., "Thermal Desorption/Gas Chromatographic/Mass spectrometric Analysis of Volatile Organic Compounds in the Offices of Smokers and Nonsmokers," Biomed and Envir Mass Spect 14(8): 363-367, 1987.

8. Drake, J. and Johnson, D., "Measurements of Certain Environmental Tobacco Smoke Components on Long-Range Flights," Aviation, Space and Environmental Medicine 61: 531-542, 1990.
9. Oldaker, G., et al., "Estimation of Effect of Environmental Tobacco Smoke on Air Quality Within Passenger Cabins of Commercial Aircraft," Indoor Air Quality and Ventilation, Selper Ltd., London, 447-454, 1990.
10. Nagda, N., et al., "Airliner Cabin Environment: Contaminant Measurements, Health Risks, and Mitigation Options," Final Report to the Department of Transportation. DOT-P-15-89-5. U.S. Government Printing Office, December 1989.
11. Proctor, C., "A Study of the Atmosphere in London Underground Trains Before and After the Ban on Smoking," Toxicology Letters, Proceedings of the International Experimental Toxicology Symposium on Passive Smoking, E. Mohtashamipur (ed.). Amsterdam, Elsevier, 131-134, October 23-25, 1986.
12. Turner, S., et al., "The Measurement of Environmental Tobacco Smoke in 585 Office Environments," Presentation at ISEA Meeting, Atlanta, GA., November 1991.

E. Ventilation System Checklist²⁰

There are several steps to be taken in order to ensure more dependable operation, extended equipment life and increased efficiency of an HVAC system:

- Fresh air dampers for the HVAC system should be kept at least partially open at all times, even in extremes of weather. ASHRAE 62-1989 sets outside air ventilation

20. Adapted from International HO-RE-CA, October 1989.

rates, and it is important to comply with them to minimize risks to health.

- Air filters should be checked for both quality and fit. Gaps in filters will allow air to bypass them and thus render them useless. Filters should be replaced when they become heavily soiled, and a filter supplier should be consulted for high quality, efficient filters.
- The chamber which contains the filters should be kept clean at all times.
- Return air grilles should be cleaned regularly and should not be blocked. These grilles are usually located in the walls or ceilings.
- The condensate from cooling systems should drain away properly and the drainage trays and pipework should not be allowed to become clogged.
- Exterior units should be cleaned and painted.
- One strategy for the building manager is to create "floating" smoking and nonsmoking areas which can expand or contract depending upon demand (if permitted by local ordinance.) A "core" smoking area should be placed

closest to the main air return grilles so that excess smoke does not drift to nonsmoking areas. The air handling unit serving the smoking area should always be run with an acceptable proportion of outside air as specified in ASHRAE Standard 62-1989.